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Reprinted from the Boston Medical and Surgical Journal

Vol. clviii, No. 24, pp. 894-900, June 11, 1908 and

Vol. clviii, No. 25, pp. 933-937, June 18, 1908

BOSTON

D. C. HEATH & COMPANY

120 BOYLSTON STREET

1908





MODERN MEDICINE AND SURGERY IN THE ORIENT.*

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A RECENT visit to the Orient has afforded me the opportunity to study modern, scientific medicine as it exists there to-day. Through the courtesy of members of the medical profession and others, I was permitted to make extended observations of the conditions which are present, and which have exerted a dominating influence in the development and growth of scientific medicine in the East. I have chosen to speak of modern, scientific medicine in the Orient and not of ancient, empiric medicine, as the history of medicine tells us it existed from the earliest recorded period of time. In a paper which I read before the association, at the meeting at St. Louis in 1904, on the "Evolution of Surgery," I directed attention to the practice of the art of surgery at that time when it existed as an art and not as a science; and in considering the evolution, or the unfolding, of surgery, I endeavored to show that this was accomplished by a gradual ingrafting of the science, influenced greatly by important controlling factors, most importantly by the cultivation of human anatomy, so auspiciously begun in the great school of Alexandria three hundred years before the Christian era, inspired by the instruction of Herophilus and Erasistratus, the first anatomists who dissected and described parts of the human body.

* Read by title at the meeting of the American Surgical Association, held in Richmond, Va., May 4, 1908.

Following in order, comparative anatomy, physiology, pathology, chemistry and therapeutics were brought to make their contributions to the growing science, broadening the fields of investigation and determining its scope.

In the beginning, the art of surgery was advanced to quite a high degree in some parts of the Orient, notably among the Hindus, where such important surgical operations as lithotomy, herniotomy, abdominal section, with intestinal excision and suture, Cesarean section, extraction of cataract, plastic operations for restoration of the nose were undertaken; fractures and dislocations were treated and differential diagnosis elaborated; constitutional treatment was instituted in surgical cases; numerous surgical instruments were designed and manufactured, most of which are in use to-day.

From this beginning in the East, medicine came into the West; was developed by teaching and authorship, and as well by individual attainment, by the systematic courses of instruction in the school of Alexandria, and the genius of Galen, of Celsus and of Paulus of Egina; elaborated as it stepped upon the continent of Europe by the erudite Hippocrates, whose treatises in the "Hippocratic Collection" were encyclopedic in character, perfect models in descriptive precision, giving evidence of original investigation, of accurate observation, of knowledge and of skill gathered in fields of wide experience; expounded in the great universities of Salerno, of Padua, of Naples and of Bologna, that of Padua giving to the world William Harvey, the discoverer of the circulation of the blood, a student in anatomy under the illustrious Fabricius. Progressing across the continent it found exposition in the universities of Paris and of Lyons, and crossing

the channel, reached the portals of the University of Edinburgh, where clinical medicine and surgery came into existence — methods in teaching which, in their far-reaching influence, were the most important contributions which had been made up to that time, and which have determined, to this day, the character of medical instruction the world over.

To our country the University of Edinburgh gave instruction in medicine, through Dr. John Morgan, a graduate, who in 1765 founded the Medical College of Philadelphia. This college, continued in direct succession, is, in full development, the medical department of the University of Pennsylvania.

As a science, medicine returns to-day to the Orient, expanded, purified, refined, made what it is by the genius of Virchow, of Pasteur, of Koch and of Lister, who, as illustrious disciples of their noble profession, have made such eminent and valuable contributions, whereby suffering humanity finds relief. Into the hands of the intelligent physician they have placed goodly weapons with which to wage the never-ending warfare against disease and pestilence; have made it possible for enlightened communities to anticipate the impending contagion, and by the timely adoption of well-defined measures and the use of agents, the value of which has been accurately determined, render harmless its attacks.

To the efforts of these great promoters of modern medical science should be added the results obtained by the patient and painstaking labors of the original investigator in the laboratory and in the institute for research, who, unmindful of the luxurious rewards of wealth, with self-sacrificing zeal and well-trained intellection, spends his life in unremitting toil, — to extract truth

from refractory nature, to contribute knowledge to the common stock, and to make good the statement that in the fifty years past "the world has learned more of truth available for the improvement of man's stay on earth than was known in the thousands of years between the dawn of creation and the Middle Ages." And thus the science of medicine, with other sciences which in this fleeting half century have so profoundly influenced the life conditions of the world, has passed on to the ancient and crumbling civilizations of the East, following closely in the wake of the trader, seeking commercial opportunities, and, hand in hand with the devoted missionary, bearing messages of love, of faith and of hope inculcated by the Great Physician and Healer. Together they have penetrated the innermost parts, have quickened the stagnant thought and awakened the dormant energies of China, have regenerated Japan, engrafting upon conditions of life engendered by the feudal state, intellectual, social and political, the energizing influences of western civilization. In India they have torn asunder the time-honored, self-satisfying tenets which controlled their schools of philosophy, and uncovered to the gaze of the world the mystic elements of their cults.

To comprehend the position of modern scientific medicine in the Orient we must have knowledge of the institutions engaged in teaching the science, the methods of instruction employed in theory and practice, their equipment with all of the appliances for the successful conduct of laboratory and research work, the provision for extended clinical instruction, the attainments of the teachers and the place they occupy in the world of science. In Japan, the country I visited first, this knowledge was not

very difficult to obtain. Education in medicine is there a part of the general system, which is as complete in its development as may be found in any country of the world. The educational center is Tokyo, the seat of government since 1590, and the residence of the Mikado or Emperor since 1868, when he left Kyoto — where he had been a virtual prisoner and deprived of his imperial rights and privileges by the Shogunate — the head of which was the Shogun who, with his great feudatories, his armed retainers and well-filled exchequer, had ruled the empire. The act of interference by the United States government in 1853, when Commodore Perry with his fleet sailed into the harbor of Yokohama and demanded on the part of his government the abandonment of the policy of isolation practiced by Japan, gave the final blow to the Shogunate and restored the Mikado to the absolute power which had belonged to his ancestors centuries before.

In Tokyo one of the two great universities of Japan is located; the other is in Kyoto. That in Tokyo consists of six colleges of law, medicine, engineering, literature, science and agriculture. Students come to the university not only from all parts of Japan, but also in great numbers from China. At the time of my visit I was told that there were some fifteen thousand Chinese students in attendance in the educational institutions of Tokyo. This fact is significant when considered in connection with the increasing influence exerted by Japan in the affairs of China and of the possible effect this may have upon her future.

Of the one hundred and thirty-one professors in the university, the College of Medicine has twenty-four, with four to five hundred students, who pay a tuition fee each year of fifty yen — twenty-five dollars. The prescribed course of

instruction covers a period of four years, and the students are divided into four classes. The curriculum includes all of the branches of medicine; those fundamental being assigned, as is usual and necessary, to the first years, and the practical courses coming in the last, with instruction in hospital wards and in the clinical laboratories. There are two hospitals connected with the work of the college, having a total capacity of five hundred and seventy-one beds. The material for clinical instruction is very large, and the two operating rooms, which seat three hundred students each, are examples of the most modern methods of construction, supplied with all of the requirements for perfect aseptic operative procedures.

As the early instructors in medicine were Germans, the teaching is German in character; some of the lectures are delivered in the German language and the textbooks are largely German or translations from that language. The library is large and supplied with volumes on all of the subjects of medicine, many in the English language, among them a number of American textbooks.

In addition to the College of Medicine of the university there are in Japan eight other medical colleges. These institutions do not possess the authority to grant licenses to practice; the graduates are required to pass a satisfactory examination before a special board of medical examiners before they receive permission to practice. In these institutions the standard of instruction is of the best character, equal in every respect to that of the university medical college. Foreign physicians who are graduates of medical colleges having a reputable standing will, on application, be granted a license to practice.

There are a number of hospitals in Tokyo outside of those connected with the medical colleges. Most if not all of them have a training school for nurses, the courses in instruction of which extend over a period of two years. The outdoor clinics or dispensary services are crowded each day by the poor who are in need of medical treatment. In the Tokyo Charity Hospital, with 150 beds, there is a training school for nurses with 85 pupils. The Army Hospital is the largest in Tokyo, having 500 beds; in this hospital the nursing is done by the soldiers, who receive special training for this service.

The hospital considered the best in Tokyo is that of the Red Cross Society, with a capacity of 250 beds, a staff composed of the best physicians in the city, and a corps of 260 nurses, more than one nurse for every patient. This excess in the number of well-trained nurses insures effective service and gives a deserved reputation to the hospital.

My friend, the late Dr. Senn, to whom I was greatly indebted for cards of introduction to the prominent medical men of Japan, and from the account of whose investigations I learned much of the condition of scientific medicine in the East, has spoken in this way of the Japanese nurse: "The Japanese women by birth, nature and training are admirably adapted for the care of the sick. Their graceful stature, the innocent, sympathizing expression of their eyes, their small delicate hands and their light noiseless gait are qualities which go far to make them ideal nurses. Each candidate for the training school connected with the Red Cross Hospital must have a good elementary education, and is subjected to a thorough physical examination. The age limits are from eighteen to thirty years, and for military

service from twenty to forty years. The nurses in the Red Cross Hospital receive the most practical kind of instruction by lectures and demonstrations. They are made nurses and not half doctors, as is the case with many of our training schools. They serve an apprenticeship of three years, and on passing a satisfactory, rigorous examination, receive the necessary credentials, which entitle them to enter private practice. A graduated nurse in private practice receives from one yen (fifty cents) to a yen and a half (seventy-five cents) a day — quite in contrast with what our nurses are accustomed to charge for their services when on duty. A gilt maple leaf is the insignia of a graduate nurse from this institution, while the small red cross on the front of the high white cap is common to the graduate and undergraduate nurse. In the operating room the anesthetic, usually chloroform, is administered by the drop method by a graduate nurse, supervised by one of the surgical assistants. The nurses make the necessary preparations for the operation and handle the instruments and dressing material. The gauze sponges are sterilized in a tube-like tin box with a closely fitting cover. The nurse opens this box, grasps the sponge with an aseptic forceps, and with this instrument hands it to the operator. As soon as a Japanese young woman is accepted as a pupil, she leaves behind her native dress, which is exchanged for a white dress, and the wooden sandal or clog gives way to the noiseless straw sandal. In case of war, the Red Cross nurse when ordered to duty wears a black dress and a white cap."

This is, indeed, a pleasing picture of the attractive qualities of the Japanese women which would make them ideal nurses, and I hesitate to say aught which would cloud its coloring or disturb

the harmonious blending of its tints. I think, however, that it has not been so painted by some who have gone amongst the Japanese people, have observed their characteristics and become acquainted with their social conditions. There are no people in the world who claim a civilization above that of the barbarian, so bereft of emotions as are the Japanese; they are trained in a school of rigid repression of such attributes of the mind and heart. The obeisance of recognition which, when made to a superior in social position, brings the woman to the floor, on bended knees and with cringing body, does not express any sentiment save that of abject servility. Between father and mother, husband and wife, sister and brother, there is no conduct which betokens parental, conjugal or filial love and affection; wifely respect and homage to the husband and father and filial obedience are so unyielding that with joy and gladness, encouraged and supported by the hearty approval of family, relatives and friends, the young daughter, budding into womanhood, consigns herself to a life of shame at the behest of the father to relieve him of financial embarrassment. Obedience to the command of the father and of his male descendant and his successor, the oldest son, as the unchangeable head of the family, is regarded and classed as a cardinal virtue, and has been cultivated as such from time immemorial. So incomprehensible is the conception of morality by these people, and so much at variance with that entertained by people imbued with the principles of a Christian civilization, that no disgrace attaches to any violation of the moral law. To such extent does this exert a controlling influence that the inmate of the Yoshiwara, the quarter of the city inhabited by the licensed prostitutes, may be taken out to become the respected wife

of one in her social class. This fact was told to me by a lady who, in her missionary experience knew of such instances, and inspired by the highest motives of duty to a fellow-being, who could claim forgiveness, because "she knew not what she was doing," had assisted in the work of reclamation.

In no other part of the world is the Red Cross Society so perfectly organized or so efficiently equipped for rendering service to the sick and wounded of the army and navy in the time of war, and in the time of public calamity to the people, as when earthquakes, volcanic eruptions, inundations, hurricanes, shipwrecks, railway disasters, etc., occur. The society owns two hospital ships, which are placed in service to take care of the sailors, and are also used for transportation of the sick and wounded of both systems of the military service,—army and navy. During times of peace these ships are leased to a transportation company, subject to immediate release from this service when needed. The revenue received in this way contributes to the building of other hospital ships. The store-rooms of the society are filled with articles and appliances which may be needed in the performance of the most important duties of those in charge of the work of the society in the field or on board of the hospital ship.

An Imperial prince is the honorary president of the society, and the membership is 900,000, making it the largest in membership in the world and, as well, the richest. The income in 1903 was over 2,965,300 yen or \$1,482,650. A large corps of surgeons and trained nurses are ready to report at short notice, and when they are on duty are under military control.

A card of introduction to Baron Hashimoto, one

of the retired surgeon-generals of the Imperial Japanese army, and very active in promoting the work of the society, opened the doors of the hospital to me and gave me the pleasure of meeting him. A lady friend, Miss Annie West, a missionary of twenty-five years' noble service in the calling she had chosen for her life's work, who, during the Russo-Japanese war, had rendered such faithful and useful services in the hospital as to commend her to the Empress as worthy of an imperial decoration, which she received, was my guide through the hospital, in company with members of the staff of resident and visiting surgeons.

Japan has a well-equipped school for the instruction of its military medical officers. Young graduates in medicine, who desire to enter the military service are received after passing the physical examination required, into this school. They are placed under military discipline and are instructed in their duties as officers of the medical service. At stated times all of the surgeons in the military service must take post-graduate courses, covering a period of four months, in laboratory instruction and in clinical demonstrations.

Massage, the practice of which is of such value in medical and surgical conditions, is not only employed in the hospitals, where it is given by the trained nurses, but is practiced generally among the Japanese people. During the night, blind masseurs and masseuses, feeling their way through the streets of the towns and cities, with their staves striking upon the stones in rhythmical movements, accompanied by the sounds made by their wooden clogs, attract the attention of the residents by a plaintive call or a peculiar whistle. Called into the houses they administer

massage, charging a trifling fee for the service rendered, thus making it possible for the poorest class of people to enjoy the benefits of a "rubbing." The "riksha" puller, after a day's labor, equal to that performed by a horse, indulges regularly in this method of treating stiffened joints and exhausted muscles. So with the coolie whose labor is so arduous and unrelenting. The opulent merchant uses it as a luxury, and needful frequently as a stimulating fillip to a sluggish condition of the superficial blood movement of the trunk and extremities.

It is interesting to know that massage was brought into Japan by the Malays at the time of predatory invasions, when they left not only some of their peculiar customs, but gave, it is believed, by racial intermingling, ethnologic types.

Bathing is universally indulged in by the Japanese in water, the temperature of which is from 110° to 125° Fahrenheit. The bathtub is usually built in the form of a tank made of wood, varying in size according to its uses in the home, inn, or public bath house. The water is heated in a very primitive way by the introduction at one end of the tank of a small stove. Formerly in cities, as well as in villages in the provinces, promiscuous bathing of the sexes, devoid of bathing suits, was the custom; lately it has been forbidden in the cities, but is still practiced in the country districts. In the villages the tank may be placed on the sidewalk in front of the houses, on the porch, or in the open space about the house. In the absence largely of running water, the tank when once filled does duty for indefinite periods and to large and small numbers of persons. Soap is not used in the public baths, but is applied outside. Owing to the continuous use of the public

bath, the charge, at all times very small, is decreased in proportion to the use and the condition of foulness of the water.

While the labor of the barber in Japan is not so arduous and constant as that of his colleague in China, owing to the custom which prevails there of shaving the head and arranging for the queue, it is possibly more varied in that he is called upon to render service to the female sex as well, who have, when married, their eyebrows and superfluous hairs on different parts of the body removed by the razor, and their teeth blackened with the juice of the persimmon tree. In the barber shops the employees are dressed in loose, white gowns, and have placed over the mouth close-fitting pieces of gauze, which protect the occupant of the chair from exhalations which are sometimes very offensive and, possibly, dangerous.

The conditions which accompany the much-vaunted custom of bathing, whereby the Japanese claim credit for habits of cleanliness not practiced by other races of the Orient, would seem to indicate an absence of consistency in the practice, which is hostile to faithful adherence to hygienic principles and sanitary regulations.

I feel I cannot better conclude the account I have given of what scientific medicine has achieved in Japan, as is manifested in the institutions organized and conducted for the education of students in medicine, equal if not superior to many of those existing in parts of the world the people of which are disposed to boast of the great advantages they enjoy from the conditions which belong to the civilization of the West — in the great results obtained in the relief of human suffering in their well-equipped and well-managed hospitals, in their military medical schools and

hospitals, in the perfect organization and conduct of the Red Cross Society — than to speak briefly of what is being done in promoting the conservation of the public health, and of the work of the Tokyo Imperial Hygienic Institute, an institution which has been designated “the crowning point and pride of medical science in Japan.” A card of introduction gave me admission and permitted me to spend several hours in the company of the founder and director in charge — Professor Kitasato, a most accomplished scientist, — and his assistants, who afforded me every opportunity to inspect the institution and learn of its work. After graduation in Tokyo, Professor Kitasato went to Germany, where he became a pupil of Professor Koch, and gave seven years and a half to work in his laboratory. Endowed with a gifted mind, and an untiring worker, he soon gave evidence of his scientific attainments, accomplishing discoveries in bacteriology which had escaped the efforts of his learned master, notably the discovery and elaboration of a method by which he obtained a pure culture of the tetanus bacillus. Soon after his return to Tokyo, on the completion of his studies in Germany, he visited Hong Kong, China, where, at the time, the plague prevailed. His study of the disease enabled him to make a great contribution to medical science in the discovery of the bacillus pestis, or plague microbe. The Hygienic Institute is a government school of instruction and is supported by an Imperial appropriation. A small tuition fee is received from the students, some eighty in number, who are graduates in medicine and physicians engaged in practice throughout Japan. The course of instruction extends over a period of four months and is devoted entirely to laboratory and research work.

It is essentially a school of preventive medicine. Associated with the work of the institute, and under the direct control of Professor Kitasato, is a laboratory for the preparation of serums and anti-toxins for infectious diseases, including a long list, a station for the manufacture of vaccine lymph, a hospital for the treatment of patients suffering from acute infectious diseases, and a farm on which there is a colony of lepers. A large number of animals of various kinds are kept to assist in the preparation of the serums and in the research work of the laboratories, among them two hundred horses, and a number of heifers, dogs, monkeys, rabbits, guinea pigs, etc. I witnessed the operation of venesection performed upon a horse which had been infected with the plague bacillus, the blood being used for the purpose of making the prophylactic serum. The leper colony is established on a farm a few miles distant in the country, and contains about fifty patients, men and women, suffering from the two forms of leprosy, the anesthetic and tubercular, in various stages of development. Professor Kitasato hopes, by the opportunity thus afforded him in the collection of patients, to study the disease and discover a remedy for its cure.

In the Orient, Japan takes the first place in all that relates to the adoption and cultivation of modern scientific methods in medicine. That this is so, and that it has been done, is, I think, easily understood when the character of the people and their conditions of life, which have existed for ages under the feudal system, are taken into consideration. From under this system the continent of Europe emerged and gradually acquired the conditions of life, social, intellectual and political, which founded and have given character to Western civilization. It is

not so with China, with the many ages of her civilization and modes of government, nor with India under her former or present mode of government. Of all the countries of the Orient, Japan has the most perfect and extended system of education, from the kindergarten through the grammar and high school to the college and university. Education is compulsory, and the school and college training is such as to fit her citizens for diversified callings and professions. In Japan, religion does not exert the all-absorbing control as in China, and especially in India.

On completing my sojourn in Japan, I journeyed to China, stopping *en route* at Kyoto, Kobe and Nagasaki, in Japan. Hong Kong, China, was my destination, and there, through the courtesy of friends in providing me with letters of introduction, I was enabled to visit the hospitals and obtain some knowledge of medical matters. It was not a very fertile field for observation, as the city is a British concession, and is given over almost entirely to the purposes of trade. Hospitals and health offices are in the hands of English physicians and are conducted in the same manner as in the mother country. I soon learned there, as in other cities of China I visited, that outside of the few hospitals and fewer medical colleges connected with them, under British or American control, modern medical science did not have a very firm foothold in China. In the empire, to a large extent, it did not exist. For some years there has been associated with the work of the missionaries medical care and treatment of the sick among the natives. In Canton I had the opportunity, as a guest of Dr. Mary Fulton, who has founded a medical college for the instruction of Chinese women, and a hospital for women in connection with it, to

learn of what has been done in this direction. The college and hospital are conducted in harmony with the work of her brother, the Rev. Dr. Fulton, a missionary of twenty-five years' experience in this field. There is great need for educated foreign and native women physicians in China, and Dr. Mary Fulton is to be highly commended for the important work she has undertaken. In the interior the conditions of life are such as to make the practice of medicine a very difficult and arduous task, attended in some instances by danger, as was made manifest in an experience related to me by Dr. Fulton. On this occasion she was in attendance upon a case in a miserable hut, the single room of which contained not only the human family, but all of the domestic animals. The pigs, for convenience and supposed safety, were placed upon an elevated platform occupying a corner of the apartment. At midnight, during her lonely watch by the bedside, a large tiger gaining admission through the entrance, leaped upon the platform, seized an unwilling pig and escaped with it into the jungle.

Chinese girls are in constant danger of kidnapping for the purpose of subjection to immoral lives, to prevent which they are carefully guarded in their homes and in the schools which they may attend. These buildings are placed in a compound, as it is called, a place of varying size, surrounded by a high wall, and the entrances are protected by strong gates, with a watchman to guard them. Married women are not exposed to the danger of kidnapping, and in some cases the girls contract marriage at early age so that they may obtain their education unmolested.

Mrs. Butler's School for Girls, in which there are some two hundred, is an institution which is doing excellent work in the education of Chinese

girls, some of whom take up work in the missionary fields when they have acquired a medical education. I found also much interest in a visit to the Canton Hospital, which was opened, I think, in 1835 by Dr. Kerr, a missionary. This hospital has had a place in the records of surgery for many years by reason of the large number of cases of vesical calculi operated upon by Dr. Kerr. The collection of calculi in the museum contains hundreds of specimens, and they present many points of interest in character and size.

On the day of my visit I witnessed two operations by Dr. Todd, in charge of the hospital, and Dr. Peck, United States Navy, in which calculi of large size were removed by the lateral method. Chloroform was the anesthetic agent used, and I was told that it was given freely to Chinese patients without danger. Also that recovery from operation was the rule, Chinese patients not being very susceptible to shock from operations or septic conditions. In the wards I saw patients lying on boards without mattresses, and simply a blanket for covering, which formed part of the ancient wooden bedsteads, with openings to permit the urine to pass to a receptacle on the floor. On all sides there were evidences of the lack of the employment of modern methods in hospital conduct, owing probably to the want of sufficient means.

In the hospital I had the opportunity of examining the small feet of a woman upon whom abdominal section had been performed. The small feet are produced by the process of "binding" the feet with tight bandages and in this way preventing their growth. It is a cruel operation and is now forbidden by imperial edict. It was done by the rich families who regarded it as a mark of distinction, indicating their position in the

social world. In the examination I made, I found it very difficult to trace the outline of the bones of the tarsal and metatarsal regions, while the phalanges appeared to have undergone such atrophic changes as to make them quite indistinguishable. I was glad to learn of the recent establishment of an Insane Hospital in Canton, accomplished largely through efforts of the missionaries. Heretofore, I was informed, those suffering with insanity were put to death. The organization of a hospital for their care and treatment is a gratifying evidence of progress, and of the proper appreciation of scientific medicine.

In Canton, sanitary regulations are not enforced and the foul air and filthy streets are a constant menace to the public health. The smells are rank, and make a lasting impression upon travelers who visit the city.

In marked contrast to the conditions which exist in Canton, the traveler sees much in Shanghai which gives evidence of the influence of Western civilization, in the palatial modern buildings, hotels, clubs, hospitals and many charitable institutions. It must be said, however, that the Chinese part of the city, containing within the ancient walls over one million inhabitants, still preserves the characteristic features and conditions of a Chinese community, undisturbed to any great extent by its juxtaposition to the foreign part of the city, which is occupied by the representatives from every part of the civilized world, — official, commercial and religious, — numbering some six thousand people. There are four hospitals, one, the Shanghai General Hospital, is the largest and has a capacity of 130 beds. It is conducted exclusively for the treatment of foreigners and is in charge of the Sisters of Charity

of the Order of Saint Vincent de Paul. It was opened in 1867, and contains private rooms and wards which may be occupied by patients who can pay a small charge and receive medical treatment free. In the private rooms, the charge is one "tael" (one Mexican dollar) per day. A generous patronage makes the hospital self-supporting and gives each year a very satisfactory surplus. The remaining three hospitals are Chinese, two being in the charge of missionaries; one was established forty years ago and has on its staff foreign and Chinese physicians and surgeons. In this hospital, Dr. N. Macleod, a graduate of the University of Edinburgh, one of the most prominent foreign physicians in Shanghai, introduced in 1877 aseptic methods in surgery. Through the efforts of Dr. Macleod and the foreign physicians, much has been done to develop scientific medicine and promote the conservation of the public health in Shanghai, the influence of which is felt in some directions in the middle and northern parts of the empire. A municipal health officer was appointed thirty years ago. Over five years ago a bacteriologist was chosen and the manufacture of calf lymph begun. Vaccine lymph is sent from this station to the interior of China and is distributed to foreigners and natives. The establishment of a Pasteur prophylactic laboratory for the treatment of cases of hydrophobia gives gratifying evidence of progress. For a number of years a lock hospital has been in operation where Chinese prostitutes undergo weekly examination and treatment. Within a few years this has been incorporated with an isolation hospital for the Chinese. An insane and isolation hospital have been built for the treatment exclusively of foreigners; laundries, dairies and cattle; meat, fish and game shops

are under municipal supervision. The slaughter of cattle, except in the public "abattoir," is forbidden. All night soil is removed daily and used for fertilizing purposes. Some of it, Dr. Macleod thinks, through the agency of myriads of flies which exist, returns to the kitchen and taints the food, producing a large proportion of the alimentary canal disorders, and possibly some of the cases of enteric fevers. Among the epidemic diseases, beri-beri and cholera occur quite regularly in the late summer and autumn. Amongst the Chinese it is thought tuberculosis does not prevail to the same extent as in the white races in other parts of the world. With the exception of acupuncture, which has been very generally practiced among the Chinese for ages, the native physician does not undertake surgical operations. As a result, the hospitals in charge of foreign medical men receive a large number of surgical cases. To the Canton Hospital, stone cases come from very distant parts of the empire, the hospital having for many years enjoyed a reputation for the successful treatment of these cases. The same may be said with regard to tumors involving various organs, and parts of the body, some of them attaining great size. In considering the state of modern medicine in China, it is necessary to bear in mind that it has reached its highest development in those cities in which there is a large foreign population, comparatively speaking, which demands its practice, among other conditions of Western civilization. In order that it shall permeate the interior of the empire and have a recognized position throughout the country, it is necessary that the system of education shall be changed so as to be in harmony with that in Europe and America, or even that of Japan. Already an educational movement has

been started in this direction, which will eventually accomplish the desired result. Throughout the Orient, education has been the great lever, with which countries have been raised to the appreciation of their great, but dormant power. Japan has come to its full realization. China is awakening, and India, restless under foreign dominion, is cherishing, through its educational system, aspirations of nationalization.

On my way from China to India, I stopped at Colombo, the seaport of Ceylon, an island colony of Great Britain. A small medical college has been established here with a general civil hospital; a bacteriological institute, lying-in hospital and a colony for lepers. The instruction in the college and hospital is given by English physicians and surgeons; women students are admitted. In the hospital the nursing is done by Anglican Sisters, assisted by nurses trained in the hospital. Another general civil hospital is at Kandy, a town of 20,000 inhabitants, situated in the mountainous regions of the island, 1,800 feet above the sea level, and 50 miles from Colombo. The railway, *en route*, passes through the tea plantations of Sir Thomas Lipton, the well-known tea-grower and yachtsman, whose unsuccessful and persistent efforts to return the Queen's Cup to its original home has given him an international notoriety and very largely, no doubt, increased the sale of Ceylon tea. The hospital is built on the pavilion system, with roofed connecting walks, cheerful, airy wards, and is well conducted by a staff of excellent physicians and surgeons, assisted by Anglican Sisters. It has a very interesting record in the treatment of cases of tetany, some 20 cases reported without a death. Of these cases a number were puerperal in character. The Government Botanical Gar-

dens, five miles from Kandy, is full of interest to the physician. It is an experiment station and has in it a complete collection of tropical trees and plants. In the collection of trees are specimens of the different varieties of the cinchona. It was an agreeable pastime to an inhabitant of the temperate zone to wander through groves of cinnamon, nutmeg and spice trees, the air laden with fragrant odors of mixed variety. Further up the mountain, at an altitude of 7,000 feet, there is another government botanical garden, the purpose of which is the cultivation of trees and plants indigenous to a temperate climate. These gardens are educational institutions and receive liberal support from the British government, which takes much interest in their successful conduct. In the Kandy garden it was interesting to see the monster bats, quite as large as the crow, hanging from the dead limbs of the trees in great numbers, apparently thousands of them. Disturbed by the noise of our carriage they left their points of suspension and circulated about us, filling the air with a peculiar sound and emitting a very disagreeable effluvium.

Colombo is an important seaport, the stopping place for seagoing vessels going to and coming from the East, Africa and Australia. It has never been infected by the plague owing to the precautions taken and the vigilance practiced by the Plague Committee, composed of municipal and medical officers. The spread of leprosy throughout the island is prevented by the strict enforcement of laws which compel segregation in the colony provided for all sufferers from the disease. Ceylon presents to the world a bright example of what modern medical science can do in conserving the health of the people, and in this way protecting its commercial interests, so

as to make it the richest colony of Great Britain.

From Colombo I sailed to Bombay, a city of India sharing, with Calcutta, distinction as a great commercial metropolis and, as well, as a medical center. It has a population of nearly eight hundred thousand, somewhat less than that of the capital, Calcutta, and it is the seat of the Grant Medical College, the largest one of the four medical colleges of the country. Connected with the colleges are hospitals which are used in conducting clinical and laboratory instruction. Besides these hospitals there are many located in the cities and towns throughout the country. The teachers in the colleges and attending physicians and surgeons in the hospitals are taken from the corps of medical officers in the Indian medical service of the Indian military service, which consists, at the present time, of 175,000 English and 250,000 native troops. Since the mutiny in 1857 the proportion of English to native troops has been increased and the native troops are now enrolled from the lowest Hindu castes, which are not inspired with the spirit of nationalization as are those of the higher castes, and are, therefore, more subservient to discipline. The teachers in the colleges and medical officers of the hospital receive fairly liberal compensation for their work, and on retirement are placed on the pension list. In case of death the widow and children receive pensions, the boys up to the period of manhood, and the girls until marriage. The students in medicine, male and female, consist of Hindus, Parsees and Eurasians, or half-breeds. Very few Mohammedans enter the medical profession. The male graduates in medicine enter the military medical service among the native troops, obtain hospital positions and medical office in the muni-

cipal governments, engage in private practice, or serve as district physicians in the civil service which in its work covers the entire country. In upper India I met on the train a civil service medical officer who informed me he was returning from a visit through his district which had a population of 3,000,000 people. He, with a large corps of native physicians, had the medical care of this large number of inhabitants, a colossal undertaking in the presence of epidemics of contagious or infectious diseases. The female graduates in medicine take up hospital work, or engage in private practice, in which the success is not very great. Training schools for nurses are connected with the various hospitals; in these the instruction and training are not quite as efficient as in those of Japan. The medical colleges are in affiliation with the universities which constitute the head of the educational system, carried on by the British government. They are organized and conducted upon the same plan as the medical schools of Great Britain, the mother country, the requirements for admission and graduation and the courses of instruction, including dentistry, are the same as in those schools. Students who desire to enter the military service after graduation must be of European or Eurasian parentage.

From this statement of the character of the medical institutions concerned in teaching scientific medicine in India, it will be interesting to note to what extent modern methods are employed in dealing with the great question of the prevention of disease and the successful control of it when present. There are many endemic and epidemic diseases, occurring yearly in different seasons, which, owing to the religious beliefs and superstitions of the natives, as well as to their modes of life, make the work of the medical men

most difficult, and, in some instances, absolutely nullify their efforts. The government with all of its power refrains, except in extreme conditions, from the enactment and the execution of sanitary laws and regulations; hesitates to interfere with religious rites and customs which may be harmful to the well being and welfare of the community lest the quickened sensibilities of the natives should be aroused and increase the difficulty of peaceful control. The Hindu, whose religion forbids him to kill an animal, permits the plague rat, which carries in its hairy covering the plague flea, to eat from the receptacle containing his food, and shares with him, without restraint, the filthy hut he inhabits. The municipal authorities trap the rat on his place for the purpose of submitting it to examination and using it in experimentation and the Hindu makes it free. The government has, indeed, been successful in interdicting Sutteeism, the self-immolation of the widow upon the funeral pile of the deceased husband, but it has not been able to prevent absolutely infanticide, caused by exposure of the female infant upon the banks of the sacred rivers, to become the prey of the rapacious crocodile. It required, I was informed, much tact on the part of the municipal authorities to prohibit the subject of smallpox, with fully developed eruption, from parading the public streets of Bombay, or taking part in public meetings of the natives; and so it may be stated with regard to other conditions of life, which are hostile to the welfare of the community, as for instance the public cremation of the body of the Hindu, in the open air, dead from contagious or infectious diseases of most dangerous character, or the exposure of the dead bodies of the Parsees in the Towers of Silence, where the soft parts are devoured by vultures. The Towers

of Silence are on Malabar Hill, one of the most fashionable parts of Bombay, and the residence largely of the opulent citizens. A large reservoir which supplies this portion of the city with water is but a short distance from the Towers, and until three years ago it was uncovered. It is related that it was not an unusual sight to see pieces of the dead bodies, carried away by the vultures, dropped by them into the water of the reservoir, and also, that unfinished morsels of fingers and toes were brought into the houses of the fashionable residents of Malabar Hill by their pet dogs and cats who gathered them on the well-kept lawns, on which they had been deposited by the vultures as they rested in the trees. Notwithstanding these unfavorable conditions and almost insurmountable difficulties, which obstruct the adoption of progressive methods, the medical officers of the Indian Medical Service with commendable zeal continue their efforts to educate public opinion, and to inspire the natives with an appreciation of their labors in their behalf.

The plague appeared in India in 1896, since which time it has killed over one million of the inhabitants, including in the list a few Europeans and not many Parsees. When it was ascertained that the plague rat was the cause of the disease, a war of extermination was commenced in different parts of the country, and by the orders of the government a bounty was paid for the rats killed. It is interesting to note that, after a time, it was found that the natives had formed rat-raising corporations, which carried on a lucrative business,—the adoption of a bit of Western civilization quite novel and unexpected. The government, moved by an appreciation of its duty, called into existence the Research Commission, of which Mr. W. M. Haffkine, a scientist from

Russia, was made the head. This gentleman has made valuable contributions to medicine in the discovery of a cholera serum and a plague serum, each possessing prophylactic powers. The commission was installed at Parel, a suburb of Bombay, in a large building, located in spacious grounds, which had been the residence of a former governor-general. At the time of my visit Lieutenant-Colonel Bannerman, Major Lamb and Captain Liston constituted the commission, and to these officers I carried a letter of introduction from Mr. Millard, Honorary Secretary of the Natural History Society of Bombay, which gave me the opportunity of observing the work done in the research laboratory. To these gentlemen I am indebted for many courtesies.

The commission, acting in co-operation with the board of health of the city, receives each day a large number of rats, which are trapped in the different districts of the city, especially in those infected with the plague. Each trap is covered with a strong cloth covering and then tagged, stating the kind of rat — *rattus* or *rattus decumanus* — and where trapped. These are then transported to the laboratory and submitted to examination. On the day of my visit four ox carts laden with filled rat traps arrived, and I was informed that on some days, at least one thousand were examined. The first step in the process of examination consisted in placing the live rats — some are found dead from the plague, and these are brought with the live rats to the laboratory — into an hermetically sealed receptacle and subjecting them to the vapor of chloroform. This agent kills the rat, and simply stupefies the fleas. When dead, the rats are placed on a table, covered by white paper, at which stands an examiner, a European, and his assistant, a native.

These strip the rat with the hand, and by this movement dislodge the stupefied fleas which, falling upon the white paper, are picked up by the moistened finger end, and placed in a test-tube, closed with a sterilized stopper. Shortly the fleas revive and are put away for use in demonstrations. From this table the rat is carried to the next where the autopsy is made, and the organs infected are removed. Usually the inguinal and axillary, seldom the cervical lymphatic glands, in some instances the lungs and the liver, are found involved. These organs are placed in a preservative fluid and kept for further examination and experimental purposes.

The fleas are used in two ways in experimentation. In the first a guinea pig is placed in the inner compartment of a box, shaped like a large cheese-box, which is enclosed by wire netting having a large or small mesh, and the live fleas are deposited in the outer compartment on the floor which has been covered with plain paper. If the meshes in the wire netting are large enough to permit the fleas to enter the inner compartment in which the guinea pig is placed, it is found that the animal is infected with the plague bacillus and after a period of incubation of nine days the disease manifests itself. If the meshes of the wire surrounding the inner compartment are too small to permit the ingress of the fleas, the animal is not infected. If, instead of the ordinary paper, "tangle-foot paper" is used to cover a portion of the floor of the outer compartment, leaving a free border on which the fleas are placed, it is found that the animal escapes infection, the fleas being unable to cross over the tangle-foot paper. The fluid obtained by crushing a number of fleas conveys infection, if injected hypodermatically into a non-infected rat or a guinea pig; the same condition

occurs if the fluid is obtained by crushing the infected organs taken from a plague rat. These experiments prove conclusively that there is, first, a plague rat, stated to be indigenous to the Orient, of two or more varieties, *rattus* and *rattus decumanus*. Second, that the flea on the plague rat becomes infected, and acts as the medium of conveyance to other animals which are susceptible, and to the human subject. It is believed that the flea does not become the host in the same sense as in the case of the mosquito in malarial and yellow fever infections. The flea, it is stated, at the time of biting passes a fluid from the intestine which contains the bacillus and which is rubbed into the wound made, either by the hand of the person bitten or by the clothing.

In my interview with Professor Kitasato, at Tokyo, I understood that he did not accept, unreservedly, this method of infection in the human subject. He thought the bacillus could enter the body by inhalation, or through abrasions on the feet or on other parts of the body, the bacilli having been set free from rats dead from the plague, and which had undergone decomposition. Further investigation of this subject it is hoped will determine positively the question as to the mode of conveyance of the microbes from the flea to the human subject. It would appear reasonable that the flea should act as the host, as in the case of the mosquito in yellow fever infection.

Calvert (Osler's "System of Medicine") states "that the origin of the plague among rats has not been determined; it may arise from infected material recently introduced into a district or propagated by cases among them. Rats with open ulcers from broken down buboes are important factors in keeping the disease alive. Flies and

fleas contract fatal plague; the former may infect food, the latter transfer bacilli from place to place and their bite produces direct infection.

"Bacilli may remain virulent in the stomach of bedbugs for a number of days; their bite is harmless; if mashed on the wound infection may take place. Ants harbor bacilli for a number of days, or may carry infection from place to place, especially from cadavers to the surface of the ground. Buboës occur most frequently in the groin, next in the axilla. Infection, in majority of cases, occurs through skin of the trunk or extremities, may enter any abrasion or even microscopic wound of skin or mucous membrane. In children, infection occurs most often through abrasion of the buccal mucous membrane. Bacilli introduced into the stomach may or may not produce infection. In all well-advanced cases all of the secretions and excretions may contain bacilli. Pus from buboës, excretions from pustules, vomitus, sputum in pneumonic cases, bedding, furniture and room may become infected. Those in attendance are exposed to infection through abrasions. Very few hospital attendants have contracted the disease. Cadavers contain many bacilli and are dangerous sources of infection until disinfected or destroyed by cremation. One bacillus may produce infection. The viability of bacilli is long; intense cold does not kill the organism. To ordinary disinfectants bacilli are very susceptible. Contagion is conveyed by convalescent patients with old unhealed ulcers from buboës, and individuals who have been exposed to infection, but have not developed the disease, may convey it. On board of ship, clothing, merchandise, fabrics and raw materials are most important means of conveying the disease. Water and air are not good carriers of

infection. Insects in limited areas may be sources of infection. Plague thrives best among those who live in filth. From twenty to forty years of age the majority of cases occur. This is believed to be on account of the exposure which occurs at that time of life.

Since my return from the Orient I have had an opportunity to examine the *Public Health Reports* issued each week by the Public Health and Marine-Hospital Service of the United States, and have been greatly interested in learning of the extensive work done by this service in connection with the prevalence of the plague at San Francisco and in cities adjacent, Oakland, Point Richmond and Emeryville, Cal. The causes of the disease have been attacked with the most modern measures and with an energy which gives promise of complete obliteration, although experience thus far gained seems to indicate that when it once gains a foothold it is not possible to permanently eradicate it. Rat destruction, by trapping and cremation, and by the deposit of poisons, has been carried on extensively, those destroyed numbering thousands, and an abatement in the spread of the disease has been noted. I have learned from the Surgeon-General of the Public Health and Marine-Hospital Service that a small quantity of plague serum was used during the early part of the present outbreak in San Francisco and, further, that the Bureau is informed that plague serum has never been successfully produced in the United States, owing to technical difficulties and dangers inseparable from its manufacture. Of these difficulties I was not informed in Bombay, and I was led to believe that the serum was prepared there.

In Bombay I was informed that but two varieties of plague rats had been identified, *Mus*

rattus and *Mus decumanus*. In the reports from San Francisco it is stated that in addition to these, there have been identified the *Mus Alexandrus* and *Mus musculus*. Many thousands of rats have been examined bacteriologically, and some have been, in experimental research work, infected with the bacillus pestis. A large number of premises have been inspected, many disinfected and some destroyed. The government is to be commended for the rigorous way in which the disease has been attacked, through the excellent work of the Public Health and Marine-Hospital Service; and the promise of, at least, keeping its dissemination in abeyance is very encouraging. Eternal vigilance will alone keep it from assuming an epidemic form and that must be practiced.

At the time of my visit to Bombay the plague was prevalent in the city and Bombay Presidency, the reported deaths numbering weekly some twenty-four hundred. The plague hospital received as many as twenty to thirty cases each day, including the pneumonic and bubonic varieties. The former is very fatal, the lungs are affected and patients die in three or four days after development of the disease. In the bubonic form the inguinal glands are inflamed and pass on to the stage of suppuration; the disease progresses more slowly than in the pneumonic variety. A general septic condition is present in all cases; if recovery takes place the convalescence is slow, and sometimes retarded by complications. The treatment is expectant, stimulating and supporting. Suppuration of the affected glands is hastened by poulticing, and aseptic incision is practiced when fluctuation is present. Excision of the affected glands has been performed, with the hope of aborting the infection, but without marked success. The prophylactic treatment by serum inoc-

ulation is carried out by the government authority among the natives whenever it is possible. Many resident foreigners submit to the operation. Inoculation is gaining favor, and it is believed that, in not many years, opposition to its practice by the native population will be generally overcome and it will take its place by the side of vaccination as a well-established preventive measure. The plague serum is prepared at the Parel Laboratory and is sent to the different parts of the country. The period of immunity obtained by one inoculation is thought to be not more than two or three years. Experience gained in its use may extend this period.

As in other parts of the Orient, there is at Matunga, a suburb of Bombay, a home for lepers, where some four hundred men, women and children are cared for. Residence here is not compulsory, but the unfortunate sufferers from leprosy find in the hospital so much comfort and relief from suffering that they gladly remain; moreover, the grounds, in which the buildings are placed, are made most attractive by plants and flowers and efforts at landscape gardening. I made a visit to this institution in company with the native physician in charge, Dr. Chudder, and was much impressed by what I saw and learned. Patients exhibiting the two forms of the disease, anesthetic and tubercular, were examined in the wards, which were scrupulously clean, well-lighted and well-ventilated; in a few, operative measures by amputation had been tried, to stop the progress of the disease in the extremities; these appeared to be successful. Much is done to make the life of the inmates contented. A Hindu temple, a Mohammedan mosque, and a Roman Catholic chapel built in the grounds afforded them opportunities to worship according

to their creeds. There was no Protestant chapel. Missionary Protestant ministers from the city, I was informed, came when their services were needed. A schoolhouse provided a place for the instruction of the children, who all seemed to be happy and satisfied with their home. That which interested me greatly was the method employed in the sewage disposal, the resultant obtained being gas, which supplied all the fuel needed in heating and cooking and illumination of the grounds and buildings. A small cremation furnace had been built, which Dr. Chudder hoped would be used by the Hindus in burning their dead; it was, he said, educational in character, and thus far he had succeeded in having one body thus cremated. The substitution of the closed crematory for the funeral pile of wood in the open, he regarded as very essential for many reasons.

In Bombay, over a hundred lepers wander about the streets and gain a scanty living by begging. In Calcutta, the municipal ordinances are very strict with regard to what kind of work lepers may engage in. One ordinance, according to the report which has been made to our government by the consul-general at Calcutta, directs that "no leper shall, within certain areas from which lepers may be sent to asylums, personally prepare for sale or sell any article of food, drink, drugs, or clothing intended for human use; bathe, wash clothes, or take water from any public well or tank, debarred by any municipal or local by-law from use by lepers; drive, conduct or ride in any public carriage, or exercise the calling or trade of barber, washer-man, water carrier, baker, confectioner, tailor, draper, haberdasher, domestic servant, schoolmaster, clerk, medical practitioner or butcher."

In view of these stringent municipal regulations

it would appear that the disease is regarded as hostile, in most marked manner, to the public health, and conveyable by personal contact and through food and drink.

Each year in India many lives are destroyed by snake bites, the country being the home of the most venomous specimens of cobras and vipers. I have the report of one year in which twenty-four thousand people were killed and a large number of domestic animals. The great mortality from this cause has moved the government to take measures of prevention, and to this end has established a laboratory under the care of Major Lamb for the preparation of anti-venene, to be used as a curative remedy. This is made from the venom obtained from the venom sacs of the cobras and vipers, and is distributed throughout the country in a dried state, in small phials. Major Lamb, who has had large experience in this work, does not believe that there can be made an anti-venene which is a general specific. The anti-venene, curative in cases of poisoning by cobra bites, must be made from the venom of the cobra, and so in the case of all venomous snakes. This opinion is at variance with that entertained by Calmette, of France, the discoverer of anti-venene, who believed in a general specific antitoxin. I saw a number of cobras and vipers in the collection Major Lamb had with him at the Parel Research Laboratory, and was interested in the way they were handled in order to obtain the venom for the manufacture of anti-venene. In my early professional life I assisted, at times, Dr. Weir Mitchell in his work in connection with the rattlesnake venom, which was of great value as a scientific contribution. My duty was to hold the snake, an humble, but a very important one. In his own case, Major Lamb

exhibits the value of the anti-venene as a curative remedy, he having been bitten by a cobra whilst obtaining venom. Owing to delay in getting the remedy, he became profoundly affected by the poison before the injection could be made. The loss of the distal portion of the index finger testifies to the local effect of the fang laceration.

Our country, by reason of the acquisition of Oriental possessions, has become one of the great powers of the world, charged with important responsibilities in the care of Oriental races. Already in the Philippines have we seen the important part taken by our profession in making that country safe for the residence of military and civil officials, reared in the climates and accustomed to the conditions of life belonging here, as well as promoting the conditions of life of the native inhabitants. By reason of our close contact, social and commercial, with Oriental countries, their diseases, with their products, have come to us. The plague has, I fear, a foothold upon our Pacific coast, and leprosy exists happily to slight extent as yet, in many parts of our country. The progress of the sleeping sickness in Oriental countries gives us warning. I need not tell what is the duty of modern medical science in dealing, through its disciples, with these conditions. In our country to-day, in the home, in the village, in the town, in the city and in the state, the medical profession, equipped with knowledge as never before, and armed with the lessons of experience gained in wide fields, submerged sometimes, it may be, with disaster or crowned with success, stands on guard, the valiant protector of the health of the people.

In reverential memory, we will ever cherish the name and the exalted labors of that heroic

son of medicine, Dr. Lazear, of the Medical Service of the United States Army, who, in Cuba, gave his life, that his fellow men might live; and we point, with feelings of pride, which stir to the profoundest depths our patriotic emotions, to the transcendent achievements of Colonel Gorgas, medical officer of the United States Army, which have made possible the construction of the Panama Canal. May we not justly claim this colossal enterprise, surcharged as it will be when completed with the destinies of the people of the world, as a magnificent triumph and the crowning pride and glory of American medicine?